

Amiota (Amiota) sinuata Species-group, with Descriptions of Five New Species from Southeast Asia (Diptera: Drosophilidae)

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Abstract. A new species-group, the *sinuata* species-group, is established within the subgenus *Amiota* Loew, consisting of seven species distributed in Southeast Asia and Australia. Of them, five are new species: *A. pontianakensis* sp. nov. from Indonesia and the Philippines; *A. hernowoi* sp. nov., *A. ratnae* sp. nov. and *A. javaensis* sp. nov. from Indonesia; and *A. pengi* sp. nov. from China. A key to South-east Asian species of the group is provided.

Key words: Drosophilidae, *Amiota*, *sinuata* species-group, new species, Southeast Asia.

Introduction

Bock (1989) described a peculiar species, *Amiota (Amiota) bicolorata*, from Queensland, Australia: The thorax is brown (usually black in the subgenus *Amiota* Loew) and lacks the prescutellar setae. Possession of the prescutellars is regarded as a subfamilial attribute for the Steganinae, although some exceptions are known, e.g., *Crincosia lawgana* Bock, 1982 and the subgenera *Pseudostegana* Okada and *Parastegana* Okada of the genus *Stegana* Meigen lacking the prescutellars (Okada, 1978). In spite of this peculiarity, there is no doubt that this species is otherwise typical of the subgenus *Amiota*, e.g., having distinct, milky spots on face and thorax.

Examining many *Amiota* (s. str.) specimens collected from Southeast Asia, we found some new species having the above two characters and further confirmed that the type specimens of *Amiota (Amiota) sinuata* Okada, 1968 also share the same characters, though the original description did not refer to the absence of prescutellars. All these species have the male terminalia nearly the same in the grand plan of structure. Here, we establish a new species-group, the *sinuata* group, of the subgenus *Amiota*, including the two known species and five new ones to be described in this paper.

Amiota (Amiota) sinuata Species-group

Diagnosis. Prescutellar setae absent; parameres medially to subbasally fused to each other (Figs. 1–6, B).

Description. Head: Frontal vitta pollinose, medially with a few minute interfrontal setulae. Fronto-orbital plate glossy. Pedicel orange; 1st flagellomere yellowish gray. Face milky white on lower 1/3 to 2/5. Palpus somewhat triangular, with several stout setae on lateral margin and 1 row of weak setae near lateral margin on underside. Vibrissa prominent; other orals small.

Thorax yellowish, practically unicolorous, glossy; pleura with reddish brown patches; scutellum with dusky, somewhat irregularly shaped patch medially and laterally. Upper parts of postpronotal lobe and anepimeron milky white; the former with only 1 prominent seta. Acrostichal setulae in about 12 irregular rows. Basal scutellar setae divergent; apicals crossed each other.

Wings hyaline. Veins grayish yellow; crossveins clear. Basal medial-cubital crossvein present. C_1 seta less differentiated. Costal vein between R_{2+3} and R_{4+5} distally with about 12–15 peg-like spinules decreasing gradually in size and space on ventral surface. R_{2+3} slightly curved to costa at tip; R_{4+5} basally strongly sinuated, and distally convergent to M_1 . Halter white.

Legs yellow. Apical seta present on mid tibia; pre-apical dorsals on all tibiae. Fore femur posteriorly with 2–3 irregular rows of setae. Mid tarsus ventrally with 2 rows of minute cuneiform setulae; hind tarsus with 1 row of such setulae. Fore and hind 1st tarsomeres each slightly shorter than rest tarsomeres to-

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gether; mid 1st tarsomere as long as rest together.

Abdominal sternites pale grayish yellow.

♂ terminalia: Epandrium small, pubescent except for anterior margin, with about 6–8 setae near caudal margin and about 3–8 setae near ventral margin. Surstylus with 1 row of relatively long prenisetae on distal margin and several setae on ventral margin to caudoventral portion of inner surface. Cercus separated from epandrium, narrow, entirely pubescent and setigerous. Membrane between epandrium and cercus pubescent. Hypandrium laterally broad. Gonopods forming posteromedian plate, ^{caudo lateral} posterolaterally contiguous to posterior ends of hypandrium and anteroventral corners of epandrium. Paramere basally contiguous to arm of aedeagal apodeme. Aedeagus absent. Aedeagal apodeme flat, slightly curved, with 1 pair of arms.

Amiota (Amiota) sinuata Okada

(Figs. 1, 7)

Amiota (Amiota) sinuata Okada, 1968, *Kontyû*, 36: 305.

Diagnosis. Paramere apically round but not dilated, basally expanded laterad, medially with about 7–8 sensilla arranged in small patch (Fig. 1, B, C).

Description supplementary to the original description by Okada (1968). ♂, ♀. Head: Palpus brownish gray. Clypeus dark brown.

Thorax brownish yellow.

Abdominal tergites dark brown; 1st to 3rd medially yellow.

♂ terminalia (Fig. 1): Epandrium caudoventrally pubescent. Surstylus with about 6–8 prenisetae. Hypandrium anteromedially strongly constricted but not cut. Gonopod roof-shaped, anteroventrally somewhat pointed. Paramere distally with about 8 pits arranged almost linearly. Ejaculatory apodeme with about 3 pits on each side of apical plate; stalk as long as apical plate.

Measurements: BL (body length)=2.03–2.18 mm in 5♂, 2.04 mm in 1♀; ThL (thorax length)=0.94–1.00 mm in ♂, 0.90 mm in ♀; WL (wing length)=1.84–2.02 mm in ♂, 2.02 mm in ♀; WW (wing width)=0.74–0.90 mm in ♂, 0.86 mm in ♀.

Indices: arb (dorsal branches of arista/ventral branches of arista)=5/4, FW/HW (frontal width/head width)=0.36–0.40, ch/o (maximum width of gena/maximum diameter of eye)=0.08, prorob (proclinate orbital/posterior reclinate orbital)=1.00, rcorb (anterior reclinate orbital/posterior reclinate orbital)=0.60–0.70, vb (subvibrissal/vibrissa)=0.35–0.40, dcl (anterior dorsocentral/posterior dorsocentral)=0.40–0.48, sctl (basal scutellar/apical scutellar)=1.18–1.25, sterno (anterior katepisternal/posterior katepisternal)=0.85–0.90, orbito (distance between proclinate and posterior reclinate orbitals/distance between inner vertical and posterior reclinate orbital)=1.65–1.75, dcp (length distance between ipsilateral dorsocentrals/cross distance between anterior dorsocentrals)=0.30–0.35, sctlp (distance between ipsilateral scutellars/cross distance between apical scutellars)=1.00, C=1.11–1.36, 4c=1.83–1.91, 4v=

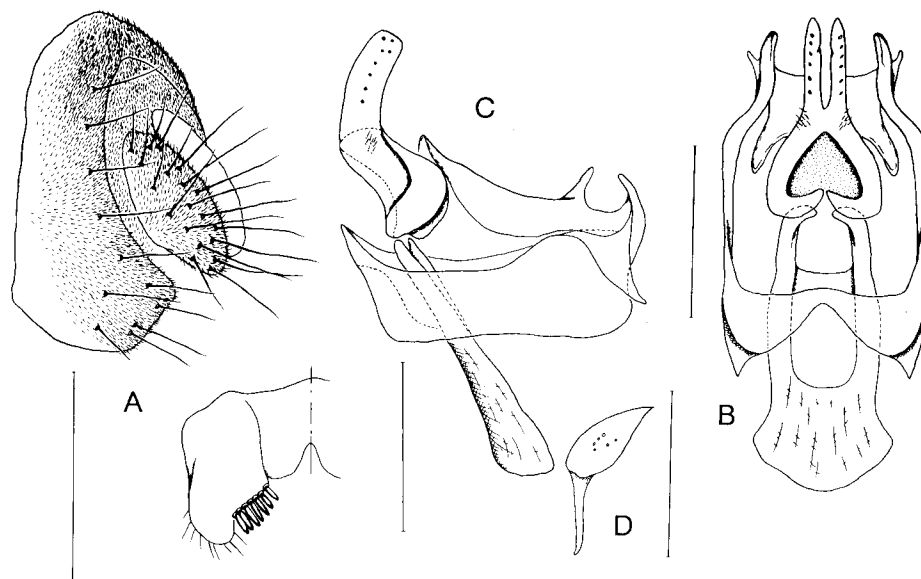


Fig. 1. *Amiota (Amiota) sinuata* Okada ♂ (from Hainan Is., China).—A, Epandrium, cercus, and surstylus; B, hypandrium, paramere, gonopod, and aedeagal apodeme (ventral view); C, ditto (lateral view); D, ejaculatory apodeme. (Scale-line=0.1 mm).

2.47–2.61, $5x=1.50\text{--}1.67$, $ac=4.71\text{--}5.42$, $M=0.67\text{--}0.83$, $C3F=0.80\text{--}0.82$.

Specimens examined. Japan: the holotype (σ^7), 1 σ^7 paratype; China: 4 σ^7 , 1 ♀ , Jianfeng, Ledong County, Hainan Is., 21. IX. 1993, coll. M. J. Toda; Myanmar: 1 σ^7 , Yangon, 10. I. 1982, coll. M. J. Toda.

Distribution. Japan (Yakushima), China (Guangdong, Hainan Is. n. loc.), Myanmar (Yangon) (Fig. 7).

Amiota (Amiota) pontianakensis sp. nov.

(Figs. 2, 7)

Diagnosis. Paramere distally dilated, subapically triangularly expanded, basally not expanded laterad, medially with about 4–6 sensilla in small patch (distal 1 or 2 somewhat apart from the others) (Fig. 2, B, C).

Description. σ^7 , ♀ . Head: Eye brownish red. Ocellar triangle dark brown, black on inner margins of ocelli. Vertex laterally yellow. Frontal vitta brown, darker on upper half and along ptilinal fissure. Fronto-orbital plate pale brown. Face brown on upper 2/3, medially slightly darker. Clypeus dark brown. Palpus grayish yellow. Gena and postgena yellow. Occiput yellowish red to brown.

Thorax brownish yellow.

Abdominal tergites dark grayish brown; 1st to 3rd medially pale yellow.

σ^7 terminalia (Fig. 2): Epandrium caudoventrally pubescent. Surstylus with about 8 prenisetae, ventrally expanded but slightly angled at caudoventral corner. Hypandrium anteromedially cut. Gonopod

anteriorly dilated and somewhat irregular or membranous on margin. Paramere distally with about 11–12 pits arranged nearly in curved row along length of paramere. Aedeagal apodeme longer than wide. Ejaculatory apodeme with about 3 pits on each side of apical plate; stalk as long as apical plate.

Measurements: BL=2.34 mm in the holotype (range in 7 σ^7 and 2 ♀ paratypes: 2.00–2.50 in σ^7 , 2.50–2.63 in ♀); ThL=0.95 mm (0.85–1.05 in σ^7 , 1.00–1.15 in ♀); WL=1.92 mm (1.75–2.00 in σ^7 , 1.90–2.00 in ♀); WW=0.80 mm (0.74–0.90 in σ^7 , 0.84–0.90 in ♀).

Indices: arb=5/3 (4–5/2–3), FW/HW=0.33 (0.30–0.35), ch/o=0.10 (0.10–0.12), prorrb=1.15 (1.10–1.25), rcorb=0.65 (0.60–0.70), vb=0.40 (0.30–0.42), dcl=0.50 (0.43–0.50), sctl=1.25 (1.15–1.25), sterno=0.90 (0.80–0.90), orbito=2.00 (1.98–2.05), dcp=0.30 (0.25–0.30), sctlp=1.05 (1.00–1.05), C=1.29 (1.11–1.34), 4c=1.94 (1.93–2.00), 4v=2.75 (2.44–2.80), 5x=1.63 (1.40–2.14), ac=4.13 (4.15–4.50), M=0.81 (0.77–0.90), C3F=0.81 (0.77–0.79).

Holotype σ^7 , Indonesia: Pontianak, West Kalimantan, 7. XII. 1996, coll. M. J. Toda (MZB: Museum Zoologicum Bogoriense, Bogor, Indonesia).

Paratypes, Indonesia: 98 σ^7 , 2 ♀ , same data as the holotype (MZB, EHU: Entomological Institute, Hokkaido University, Sapporo, Japan, and DBSC: Department of Biology, Shenyang Teachers' College, Shenyang, China); Philippines: 1 σ^7 , Mt. Maquiling, Luzon, ca. 500m alt., coll. K. Ichinose (EHU).

Distribution. Indonesia (West Kalimantan), Philippines (Luzon) (Fig. 7).

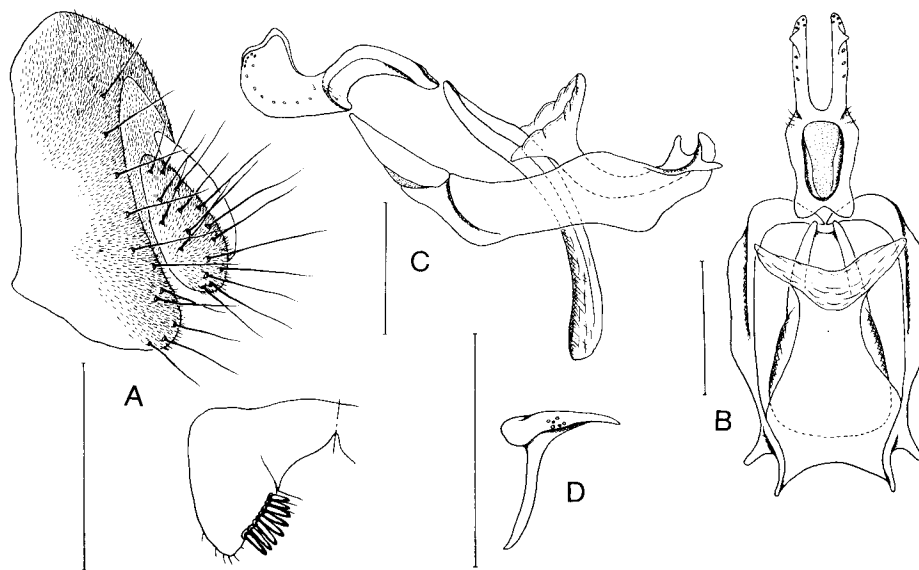


Fig. 2. *Amiota (Amiota) pontianakensis* sp. nov. σ^7 (a paratype from Pontianak, Indonesia). See Fig. 1 for further explanation. (Scale-line=0.1 mm).

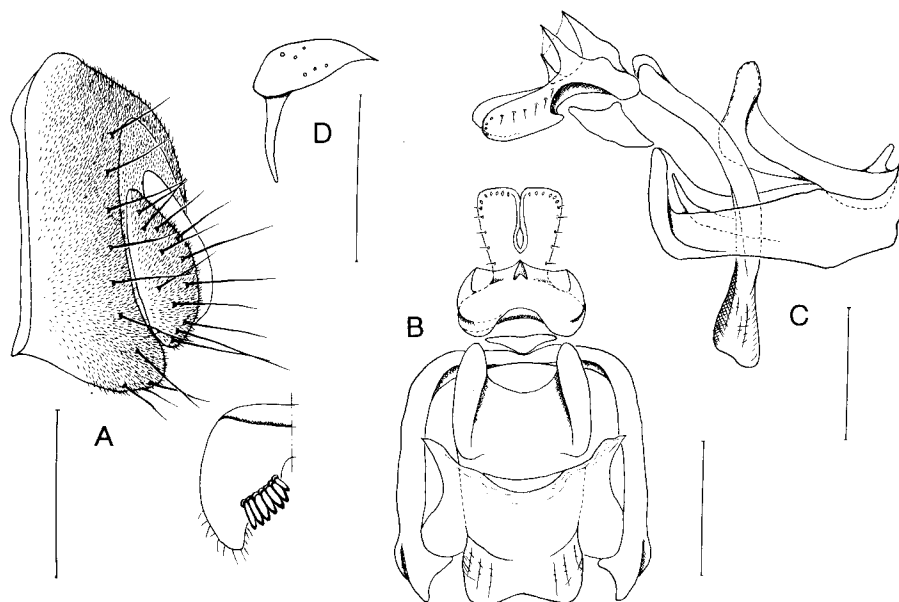


Fig. 3. *Amiota (Amiota) hernowoi* sp. nov. ♂ (a paratype from Pontianak, Indonesia). See Fig. 1 for further explanation. (Scale-line=0.1 mm).

Relationship. This species resembles *A. (A.) sinuata* in having the paramere bearing sensilla in a small patch on the medial portion and pits arranged along the length of distal portion, but can be clearly distinguished from it by the diagnostic characters.

Etymology. Pertaining to the type locality.

***Amiota (Amiota) hernowoi* sp. nov.**

(Figs. 3, 7)

Diagnosis. Paramere distally dorsoventrally flat, apically quadrate, basally with 3 acute projections connected each other with membrane (Fig. 3, B, C).

Characters commonly seen in *A. (A.) pontianakensis* are not referred to below.

Description. ♂. Abdominal tergites dark grayish brown; 1st and 2nd medially pale yellow.

♂ terminalia (Fig. 3): Surstylus ventrally much expanded, with about 7 prensisetae. Hypandrium anteromedially strongly constricted but not cut. Gonopod anteriorly forming relatively simple, vertical lobe. Paramere with row of about 4–5 sensilla on submedial lateral margin and about 5–6 pits on apical margin. Stalk of ejaculatory apodeme slightly shorter than apical plate.

Measurements: BL=2.47 mm in the holotype (range in 5♂ paratypes: 2.19–2.50), ThL=1.09 mm (0.94–1.10), WL=2.00 mm (1.88–2.00), WW=0.88 mm (0.78–0.94).

Indices: arb=5/4 (4–5/3–4), FW/HW=0.33 (0.30–0.35), ch/o=0.14 (0.11–0.14), pror=1.10

(1.05–1.10), rcorb=0.90 (0.80–0.90), vb=0.30 (0.30–0.32), dcl=0.50 (0.43–0.50), sct1=1.25 (1.15–1.25), sterno=0.80 (0.75–0.88), orbito=2.00 (1.94–2.05), dcp=0.32 (0.30–0.33), sctlp=1.20 (1.10–1.25), C=1.21 (1.12–1.25), 4c=2.13 (1.88–2.27), 4v=2.75 (2.35–2.80), 5x=1.56 (1.56), ac=4.86 (4.50–5.33), M=0.75 (0.71–0.80), C3F=0.74 (0.75–0.79).

Holotype ♂, Indonesia: Pontianak, West Kalimantan, 7. XII. 1996, coll. M. J. Toda (MZB).

Paratypes, 13♂, same data as the holotype (MZB, EHU, and DBSC).

Distribution. Indonesia (West Kalimantan) (Fig. 7).

Relationship. This species somewhat resembles *A. (A.) pontianakensis* in the shape of gonopod, but can be clearly distinguished by the diagnostic characters.

Etymology. Patronym, in honor of Mr. K. Hernowo, University of Tanjungpura, who helped M. J. T. in collecting the specimens in Pontianak.

***Amiota (Amiota) ratnae* sp. nov.**

(Figs. 4, 7)

Diagnosis. Paramere distally dorsoventrally flat, apically roundly dilated, basally without any acute projections (Fig. 4, B, C); apical plate of ejaculatory apodeme with 2 pits on each side (Fig. 4, D).

Characters commonly seen in *A. (A.) pontianakensis* are not referred to below.

Description. ♂, ♀. Abdominal tergites dark grayish

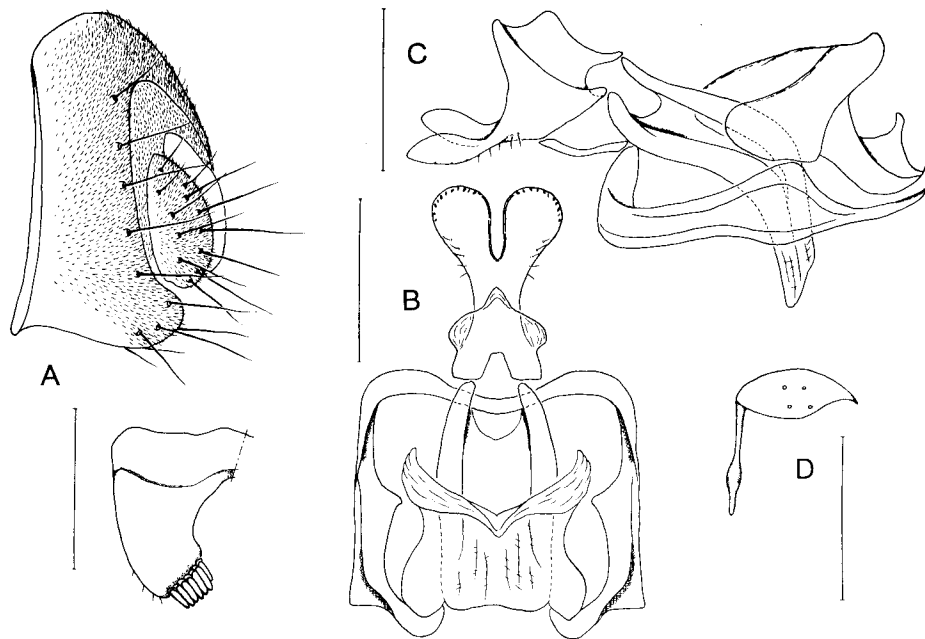


Fig. 4. *Amiota (Amiota) ratnae* sp. nov. ♂ (a paratype from Bogor, Indonesia). See Fig. 1 for further explanation. (Scale-line=0.1 mm).

brown; but 1st and 2nd medially widely pale yellow; 3rd medially narrowly grayish yellow.

♂ terminalia (Fig. 4): Surstylus with about 7 prenisetae. Gonopod anteriorly forming large, nearly bilobed plate with knob-like projection at apex. Paramere with about 5 sensilla arranged nearly in row along submedial outer margin and about 11 pits on distal margin. Stalk of ejaculatory apodeme slightly longer than apical plate.

Measurements: BL=2.47 mm in the holotype (range in 5♂ and 4♀ paratypes: 2.00–2.50 in ♂, 2.25–2.69 in ♀), ThL=1.00 mm (0.80–1.05 in ♂, 1.00–1.09 in ♀), WL=1.90 mm (1.80–1.92 in ♂, 2.00–2.19 in ♀), WW=0.86 mm (0.74–0.90 in ♂, 0.88–1.00 in ♀).

Indices: arb=5/3 (5/3), FW/HW=0.33 (0.30–0.35), ch/o=0.11 (0.10–0.14), pror=1.25 (1.15–1.25), rcorb=0.65 (0.60–0.70), vb=0.30 (0.30–0.32), dcl=0.45 (0.43–0.45), sctl=1.25 (1.15–1.25), ster-no=0.80 (0.80–0.88), orbito=2.00 (1.98–2.05), dcp=0.25 (0.25–0.30), sctlp=1.10 (1.05–1.15), C=1.15 (1.12–1.25), 4c=1.83 (1.78–1.97), 4v=2.39 (2.35–2.50), 5x=1.30 (1.30–1.46), ac=5.50 (4.50–5.33), M=0.72 (0.71–0.80), C3F=0.76 (0.75–0.79).

Holotype ♂, Indonesia: Bogor, Java, 30. XI. 1996, coll. M. J. Toda (MZB).

Paratypes, Indonesia: 6♂, 4♀, 27–30. XI. 1996, 8♂, 8. XII. 1996, Bogor, Java; 1♂, Pontianak, West Kalimantan, 7. XII. 1996; coll. M. J. Toda (MZB, EHU, and DBSC).

Distribution. Indonesia (West Kalimantan, Java)

(Fig. 7).

Relationship. This species resembles *A. (A.) herno-woi* in the shape of distal part of paramere, but can be clearly distinguished from it by the diagnostic characters, the anteromedially cut hypandrium, and the well developed gonopodal, vertical lobe with the knob-like projection at the apex.

Etymology. Patronym, in honor of Prof. E. S. Ratna of Bogor Agricultural University, who helped M. J. T. in collecting the specimens in Indonesia.

Amiota (Amiota) pengi sp. nov.

(Figs. 5, 7)

Diagnosis. Gonopod with 1 pair of apically round, somewhat recurved projections at base of anterior, vertical lobe and knob-like projection behind vertical lobe (Fig. 5, C); paramere distally slender, basally somewhat triangular in lateral view, with about 3 sensilla in patch submedially and about 5 in row distally but no pits (Fig. 5, C).

Characters commonly seen in *A. (A.) pontianaken-sis* are not referred to below.

Description. ♂, ♀. Thorax yellow.

Abdominal tergites dark grayish brown to black; 1st nearly entirely pale yellow; 2nd and 3rd medially widely pale yellow; 4th medially with V-shaped, pale yellow incision.

♂ terminalia (Fig. 5): Epandrium caudoventrally unpubescent. Surstylus ventrally not so expanded,

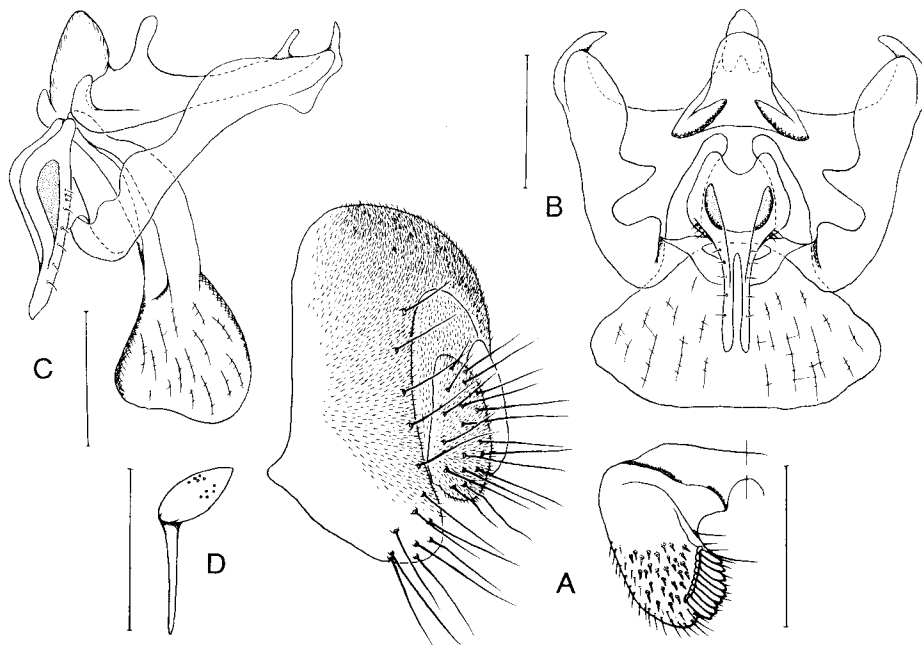


Fig. 5. *Amiota (Amiota) pengi* sp. nov. ♂ (a paratype from Hainan Is., China). See Fig. 1 for further explanation. (Scale-line=0.1 mm).

with about 8–9 prenisetae on distal margin and numerous stout spines on distal portion of inner surface. Hypandrium anteromedially widely separated into lateral lobes. Aedeagal apodeme as long as wide. Ejaculatory apodeme with about 5 pits on each side of apical plate; stalk slightly longer than apical plate.

Measurements: BL=2.75 mm in the holotype (range in 5♂ and 3♀ paratypes: 2.63–2.84 in ♂, 2.41–2.72 in ♀); ThL=1.16 mm (1.13–1.25 in ♂, 1.16–1.25 in ♀); WL=2.20 mm (2.12–2.30 in ♂, 2.00–2.44 in ♀); WW=0.88 mm (0.84–0.93 in ♂, 0.88–0.90 in ♀).

Indices: arb=4/3 (3–4/2–3), FW/HW=0.40 (0.36–0.40), ch/o=0.09, prorb=1.00 (0.96–1.05), rcorb=0.63 (0.63–0.70), vb=0.40 (0.30–0.40), dcl=0.40 (0.40–0.45), sctl=1.25 (1.15–1.25), sterno=0.95 (0.85–1.00), orbito=2.00 (1.94–2.00), dep=0.25 (0.25–0.30), sctlp=1.00 (1.00–1.02), C=1.52 (1.28–1.58), 4c=1.83 (1.72–1.84), 4v=2.78 (2.55–2.80), 5x=1.78 (1.56–1.83), ac=4.71 (4.61–4.80), M=0.89 (0.80–0.90), C3F=0.85 (0.83–0.85).

Holotype ♂, China: Jianfeng, Ledong County, Hainan Is., 21. IX. 1993, coll. M. J. Toda (GIE: Guangdong Institute of Entomology, Guangzhou, China).

Paratypes, 179♂, 14♀, same data as the holotype (GIE, EHU, and DBSC).

Distribution. China (Hainan Is.) (Fig. 7).

Relationship. This species is far related to the foregoing members of this species-group in having the paler thorax, the epandrium caudoventrally unpu-

bescent, the surstylus with numerous stout spines on inner surface, the paramere lacking pits, the broader aedeagal apodeme, and the ejaculatory apodeme with more number of pits on apical plate, but somewhat resembles *A. (A.) ratnae* in the surstylus ventrally less expanded and the gonopod with a knob-like projection (behind the vertical lobe in this species, but at its apex in *ratnae*).

Etymology. Patronym, in honor of Prof. T. X. Peng, Guangdong Institute of Entomology, who helped M. J. T. in collecting the specimens in Hainan Is.

Amiota (Amiota) javaensis sp. nov.

(Figs. 6, 7)

Diagnosis. Gonopod with larger knob-like projection just behind vertical lobe but no projections at base of vertical lobe (Fig. 6, C); paramere entirely slender, with about 9 sensilla arranged nearly in 1 row but no pits (Fig. 6, C).

Characters commonly seen in *A. (A.) pengi* are not referred to below.

Description. ♂ terminalia (Fig. 6): Surstylus with about 10–12 prenisetae on distal margin.

Measurements: BL=2.45 mm in the holotype (2.50 in 1♂ paratype), ThL=1.14 mm (1.20), WL=2.00 mm (2.25), WW=0.82 mm (0.84).

Indices: arb=3/2 (3–4/2–3), FW/HW=0.35 (0.36), ch/o=0.13 (0.11), prorb=1.15 (1.10), rcorb=0.75 (0.80), vb=0.30 (0.32), dcl=0.40

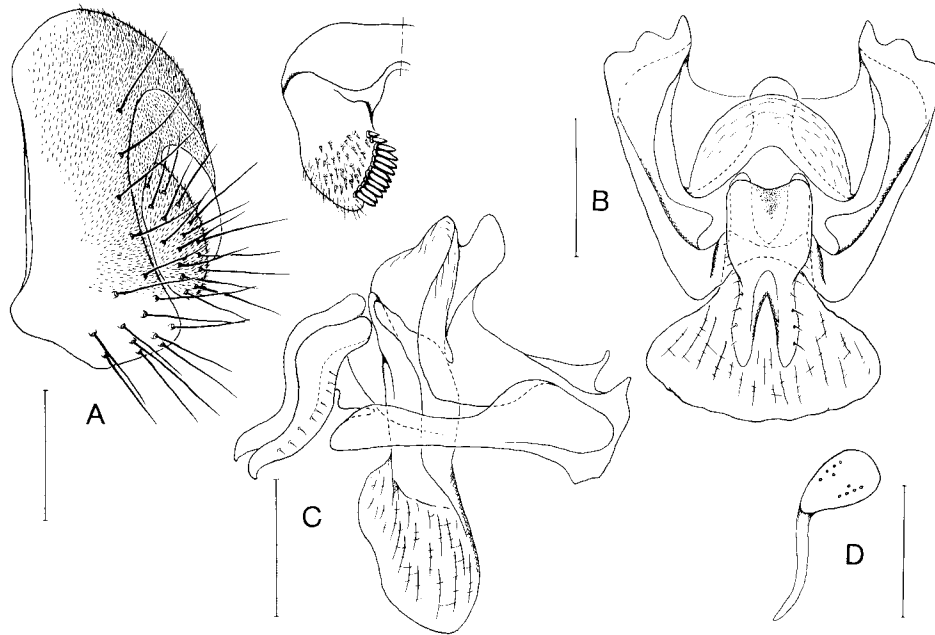


Fig. 6. *Amiota (Amiota) javaensis* sp. nov. ♂ (the paratype from Bogor, Inodnesia). See Fig. 1 for further explanation. (Scale-line=0.1 mm).

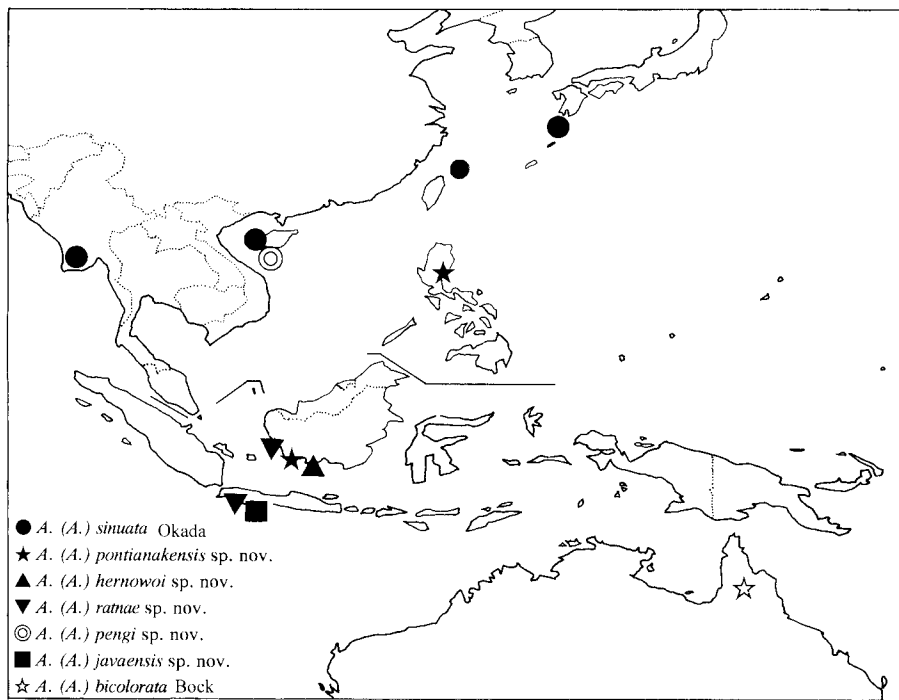


Fig. 7. Known geographical distribution of the *A. (A.) sinuata* species-group.

(0.43), $sct1=1.25$ (1.15), $sterno=0.90$ (0.88), $orbito=2.00$ (1.94), $dcp=0.29$ (0.30), $sctlp=1.00$ (1.02), $C=1.41$ (1.34), $4c=1.60$ (2.00), $4v=2.40$ (2.89), $5x=1.20$ (1.30), $ac=4.57$ (4.50), $M=0.60$ (0.72), $C3F=0.84$ (0.81).

Holotype ♂, Indonesia: Bogor, Java, 27. XI. 1996, coll. M. J. Toda (MZB).

Paratype, 1♂, same data as the holotype (EHU).

Distribution. Indonesia (Java) (Fig. 7).

Relationship. This species is closely related to *A. (A.) pengi* but clearly distinguishable from it by the diagnostic characters.

Etymology. Pertaining to the type locality.

Amiota (Amiota) bicolorata Bock

(Fig. 7)

Amiota (Amiota) bicolorata Bock, 1989, *J. Aust. Ent. Soc.*, **28**: 173.

Since this species was described on the basis of only 1 female specimen collected from Queensland, Australia, its identity is unclear. According to the original description by Bock (1989), this species may be different in only two quantitative characters from the above six species: $dcl=0.6$, $C3F=0.6$.

Distribution. Australia (Queensland) (Fig. 7).

Key to Species in the *A. (A.) sinuata* Species-group from Southeast Asia

Male.

1. Prescutellars present.
..... Other *Amiota* (s. str.) species
- Prescutellars absent. 2 (the *sinuata* group)
2. Thorax brownish yellow; epandrium caudoventrally pubescent; surstylus without stout spines on inner surface; aedeagal apodeme longer than wide, basally not strongly expanded laterad; paramere distally with some pits; ejaculatory apodeme with 2 or 3 pits on each side of apical plate. 3
- Thorax yellow; epandrium caudoventrally unpubescent; surstylus with stout spines on inner surface; aedeagal apodeme as long as wide, basally much expanded laterad like fan; paramere devoid pits; ejaculatory apodeme with 5 pits on each side of apical plate. 6
3. Distal half of paramere laterally flat. 4
- Distal half of paramere horizontally flat. 5
4. Paramere apically not dilated, basally expanded laterad. *A. (A.) sinuata* Okada
- Paramere apically dilated, subapically triangularly expanded, basally not expanded laterad.
..... *A. (A.) pontianakensis* sp. nov.
5. Paramere apically quadrate, basally with 3 acute projections; ejaculatory apodeme with 3 pits on

each side of apical plate.

- *A. (A.) hernowoi* sp. nov.
- Paramere apically roundly dilated, basally without any acute projections; ejaculatory apodeme with 2 pits on each side of apical plate.
..... *A. (A.) ratnae* sp. nov.
6. Gonopod with 1 pair of apically round, somewhat recurved projections at base of vertical lobe.
..... *A. (A.) pengi* sp. nov.
- Gonopod without projections at base of vertical lobe. *A. (A.) javaensis* sp. nov.
- Female specimens are, even if not impossible, difficult to identify to species only by morphological characters.

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